

rupted for several days after the 17th. Reports from Los Angeles, via Deming and Ogden, on the 20th, stated that a dam on the Los Angeles river broke during the night of the 17-18th, producing the most disastrous flood ever experienced. The lower part of the city was completely inundated and forty buildings were swept away. Hundreds of families were obliged to abandon their homes and seek shelter on the hills. From Los Angeles to Mojave, a distance of one hundred miles, scarcely a mile of the Southern Pacific railroad track remained in place, and from Los Angeles eastward to San Geronio the destruction was equally great. The California Southern railroad, from Colton to San Diego, was also washed out. Reports from towns in the southern part of San Joaquin valley stated that the floods in that section were the heaviest ever experienced.

Reports from San Bernardino, on the 21st, stated that the streets were covered with water to a depth of three feet, and that the houses were flooded. The town of Fall Brook was reported to have been entirely washed away. Many of the inhabitants were missing and were supposed to have been drowned. Numerous orange groves and vineyards in the San Gabriel valley were completely destroyed.

Los Angeles, California: careful estimates of the losses caused by the floods in this county place them at \$750,000, which will be more than compensated by the benefits done to the wheat and fruit crops.

San Buena Ventura, Ventura county, California: on the 5th the Santa Clara river was higher than it had been known to be for years. Several bridges were washed away and, in some places land slides occurred on the railroads. During the storm preceding the freshet 9.60 inches of rain fell.

Santa Anna, Los Angeles county, California: the rains preceding the 5th were the heaviest that have occurred for several years. For the first time in eight years the water in the Santa Anna river ran into the ocean. All of the small streams in that vicinity were much swollen.

Yuma, Arizona: the railroad tracks west of this place were badly washed by the heavy rains of the 3d, causing delay of trains for two days.

HIGH TIDES.

New York City.—The highest tide that has been known for several years occurred on the 28th. When at its maximum height, at about 9.30 a. m., the railroad tracks at the Erie depot in Jersey City were covered with several inches of water. The cellars along the river front, and particularly those on South street, were flooded.

High tides also occurred as follows:

New River Inlet, North Carolina, 7th, 14th, 17th, 28th.

Cape May, New Jersey, 27th.

Cedar Keys, Florida, 27th.

Narragansett Pier, Rhode Island, 26th, 27th.

LOW TIDES.

New York City.—The strong southwesterly winds of the 29th (low area xiv.) caused the lowest tide that has occurred for several years. Many of the larger vessels along East river front were resting on the bottom of the river. Split rock, off Tompkinsville, which is only seen about once in seven years, was two feet out of water. West Bank, near Swinburne Island, was nearly dry and miles of the beach along the south shore and Great Kills were entirely dry. Much inconvenience was experienced by the ferry boats.

Block Island, Rhode Island.—The strong northwesterly gales of the 29th (low area xiv.), caused very low tides.

Low tides were also reported from the following places:

Narragansett Pier, Rhode Island, 29th.

Point Judith, Rhode Island, 29th.

New Haven, Connecticut, 29th.

Cedar Keys, Florida, 20th.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors during February, 1884, with the average depth at which the

observations were made and the mean temperature of the air at the various stations, are given in the table below. The highest water temperatures reported during the month, 74° 8 and 77° 6, were observed at Cedar Keys and Key West, Florida, on the 12th and 19th, respectively, and the lowest, 29° 8, was observed at New Haven, Connecticut, on the 4th.

Temperature of water for February, 1884.

STATION.	Temperature at bottom.		Range.	Average depth, feet and inches.	Mean temperature of the air at station.
	Max.	Min.			
Atlantic City, New Jersey.....	42.0	33.0	9.0	4 1	37.6
Alpena, Michigan*.....	.....	.....	.....	.....	.....
Augusta, Georgia.....	62.5	46.5	16.0	10 7	56.5
Baltimore, Maryland.....	41.0	33.5	7.5	9 6	42.2
Block Island, Rhode Island.....	39.0	30.8	8.2	8 3	35.0
Boston, Massachusetts.....	33.8	30.2	3.6	22 10	31.0
Buffalo, New York*.....	.....	.....	.....	.....	.....
Canby, Fort, Washington.....	48.3	33.4	14.9	17 0	38.2
Cedar Keys, Florida.....	74.8	40.1	28.7	11 5	63.4
Charleston, South Carolina.....	60.6	50.6	10.0	40 7	58.7
Chicago, Illinois*.....	.....	.....	.....	.....	.....
Chincoteague, Virginia.....	47.1	33.5	13.6	4 7	41.9
Cleveland, Ohio*.....	.....	.....	.....	.....	.....
Detroit, Michigan*.....	.....	.....	.....	.....	.....
Delaware Breakwater, Delaware.....	40.3	33.4	16.9	8 4	39.9
Duluth, Minnesota*.....	.....	.....	.....	.....	.....
Eastport, Maine.....	33.8	32.2	1.6	15 5	24.7
Escanaba, Michigan*.....	.....	.....	.....	.....	.....
Galveston, Texas.....	66.4	51.2	15.2	12 0	60.4
Grand Haven, Michigan.....	32.6	32.1	0.5	19 0	24.8
Indianola, Texas.....	68.6	51.3	17.3	8 2	60.2
Jacksonville, Florida.....	66.6	56.0	10.6	18 0	62.1
Key West, Florida.....	77.6	71.1	6.5	17 8	72.5
Mackinaw City, Michigan*.....	.....	.....	.....	.....	.....
Macon, Fort, North Carolina.....	62.0	49.3	12.7	2 8	52.9
Marquette, Michigan*.....	.....	.....	.....	.....	.....
Milwaukee, Wisconsin*.....	.....	.....	.....	.....	.....
Mobile, Alabama.....	59.5	47.2	12.3	15 4	57.3
New Haven, Connecticut.....	35.4	29.8	5.6	14 11	31.7
New London, Connecticut.....	37.2	34.5	2.7	12 6	33.6
New York City.....	35.0	31.5	3.5	16 0	35.1
Norfolk, Virginia.....	51.0	33.0	18.0	16 10	50.1
Pensacola, Florida.....	65.1	54.7	10.4	17 4	58.9
Portland, Maine.....	33.6	30.2	3.4	17 2	29.7
Portland, Oregon.....	45.4	33.2	12.2	50 7	36.0
Provincetown, Massachusetts.....	36.9	33.2	3.7	12 9	34.1
Sandusky, Ohio*.....	.....	.....	.....	.....	.....
Sandy Hook, New Jersey.....	39.8	35.7	4.1	1 7	35.8
San Francisco, California.....	52.3	45.0	7.3	39 6	50.0
Savannah, Georgia.....	63.8	49.3	14.5	11 2	58.3
Smithville, North Carolina.....	59.5	50.0	9.5	10 0	54.8
Toledo, Ohio*.....	.....	.....	.....	.....	.....
Wilmington, North Carolina.....	60.0	43.5	16.5	17 7	56.5

* Frozen entire month.

† Observations interrupted by ice from 1st to 11th, 14th, 15th, 17th, 18th.

VERIFICATIONS.

INDICATIONS.

The detailed comparison of the tri-daily indications for February 1884, with the telegraphic reports for the succeeding twenty-four hours, shows the general average percentage of verifications to be 83.36 per cent. The percentages for the four elements are: weather, 89.40; direction of the wind, 78.48; temperature, 80.84; barometer, 84.53 per cent. By geographical districts they are: for New England, 88.29; middle Atlantic states, 87.13; south Atlantic states, 84.22; eastern Gulf states, 83.04; western Gulf states, 80.46; lower lake region, 86.48; upper lake region, 83.87; Ohio valley and Tennessee, 82.73; upper Mississippi valley, 82.01; Missouri valley, 74.93; north Pacific coast region, 78.12; middle Pacific coast region, 100.0; south Pacific coast region, 81.25. There were eighty-one omissions to predict, out of 3,504 or 2.31 per cent. Of the 3,423 predictions that have been made, one hundred and fifteen, or 3.36 per cent., are considered to have entirely failed; one hundred and thirty-four, or 3.91 per cent., were one-fourth verified; four hundred and twenty-six, or 12.45 per cent., were one-half verified; five hundred and sixty-four, or 16.48 per cent., were three-fourths verified; 2,184, or 63.80 per cent., were fully verified, so far as can be ascertained from the tri-daily reports.

Reports from the districts on the Pacific coast were discontinued on the 10th, consequently no predictions for those districts were made after that date.

CAUTIONARY SIGNALS.

During February, 1884, one hundred and seventy-six caution-

any signals were ordered. Of these, one hundred and fifty-three, or 86.93 per cent., were justified by winds of twenty-five miles or more, per hour, at or within one hundred miles of the station. One hundred and seven cautionary off-shore signals were ordered, of which number, one hundred, or 93.46 per cent., were fully justified both as to direction and velocity; one hundred and five, or 98.13 per cent., were justified as to direction; and one hundred and two, or 95.32 per cent., were justified as to velocity. There were no "northwest" signals ordered at the lake ports during the month. Two hundred and eighty-three signals of all kinds were ordered, of which two hundred and fifty-three, or 89.40 per cent., were fully justified. These do not include signals ordered at display stations where the wind velocities are only estimated. Four signals were ordered late. Of the one hundred and seven cautionary off-shore signals that were ordered, seventy-nine were changed from cautionary signals. In eighty cases, winds of twenty-five miles or more, per hour, were reported for which no signals were ordered.

Professor T. C. Mendenhall, director of the "Ohio Meteorological Bureau," in his report for February states:

During the month of February a much more extensive system of verifications of railway signals has been established. Thirteen observers along the line of the Cleveland, Mount Vernon and Delaware railway, are now co-operating with the bureau in this matter. The result for the month was, that in temperature, the predictions of the signals displayed, show a percentage of verification of 93 per cent., and in the "state of the weather," the percentage was 84.

The signals above referred to consist of colored symbols displayed from the sides of the baggage cars, representing the daily forecasts, as telegraphed at midnight from the office of the Chief Signal Officer to said bureau.

ATMOSPHERIC ELECTRICITY.

AUORAS.

An auroral display occurred on the night of the 1-2d, which has been reported by the following stations:

Eastport, Maine: a faint aurora was observed from 9 p. m. until the early morning.

Portland, Maine: a faint display was visible from 11.15 p. m. until midnight.

Gardiner, Maine: an aurora was visible from 11 p. m. until 1.45 a. m.

Point Judith, Rhode Island: a faint auroral arch of pale yellowish color was visible from 11 p. m. until 4 a. m.

Boston, Massachusetts: an aurora was suspected from 2.40 a. m. until daylight, the sky being obscured by clouds.

Fort Totten, Dakota: an aurora was visible from 7.30 to 9.10 p. m., consisting of a pale light resembling the morning dawn. The telegraph line between this place and Larimore, Dakota, was so influenced during the display as to render communication impossible.

Other displays were reported as follows:

A faint auroral display was observed at Woodstock, Maryland, at 7.45 p. m. of the 2d.

At Fort Maginnis, Montana, a faint auroral display was observed at 9.10 p. m. of the 14th. A display was also seen on this date at Sandwich, Illinois.

On the night of the 19-20th, an auroral display was observed at Smithville and New River Inlet, North Carolina. This display was reported by these stations only. At Smithville, it appeared at 6.20 p. m., and continued until 7.40 p. m., when the sky became entirely obscured by clouds. The aurora was first observed in the northwestern sky, consisting of a narrow streak of whitish light without any visible movement, and extending upward 12° or 15° from the horizon. This appearance gradually faded when a light appeared in the north, red near the horizon and straw-colored from the centre to its uppermost limit, which was about 25° above the horizon. The display attained its maximum brilliancy and extent at about 7 p. m. and, afterwards, gradually faded away, leaving only a faint glow at 7.30 p. m. At New River Inlet, this display

was reported to have been observed from 6.54 to 7.30 p. m., consisting of occasional flashes of pale yellow light.

A faint display was also seen at Smithville and New River Inlet on the 22d. At Smithville it consisted of a bright, straw-colored light, and was visible from 6.45 until 7.20 p. m. At New River Inlet it was reported to have been of a very faint yellowish color, and was observed from 6.59 until 7.55 p. m. Auroral displays were also observed on the 22d, at Swartz creek, Michigan, and Sandwich, Illinois, the observers at the latter stations not stating the time at which the displays occurred.

On the 23d faint auroral displays were seen at Gardiner, Maine, Fort Brady, Michigan, and Saint Vincent, Minnesota. At the last-named stations it was observed from 8.15 to 9.30 p. m., in the form of an arch extending over about 30° of the horizon, and to an altitude of 10° .

At 12.45 a. m., of the 25th, a faint display was observed at Gardiner, Maine.

The most widely observed display of the month occurred on the 29th. It was observed at stations both on the Atlantic and Pacific coasts, although it was not reported from stations between the upper lake region and eastern Washington Territory. In New England the display was faint, lasting from the early evening hours until midnight.

At Sandusky, Ohio, it was reported as a faint light lasting from 9.30 p. m., until midnight.

In the upper lake region the display was very brilliant. At Escanaba, Michigan, it was observed from 7.50 p. m. until after midnight, attaining its greatest brilliancy between 9.25 and 10.40 p. m., when an arch of yellow light extended from east to west and to within 8° of the zenith. At 10.15 p. m. "merry dancers" and two distinct arches were visible. Towards midnight the display became less brilliant.

At Mackinaw City the display was first observed at 9.10 p. m., when numerous streamers of various colors were seen moving across the northern horizon. At 10.40 p. m. it disappeared. At Alpena, Michigan, it was reported as consisting of brilliant streamers, shooting upward from a dark segment on the horizon, and having an apparent motion from the east. The display continued until 2.30 a. m. of March 1st. At Marquette, Michigan, the display was faint, appearing first at 7.45 p. m., fading away at 8.20, reappearing at 10.10, and finally disappearing at 11.20 p. m.

The observer at Port Angeles, Washington Territory, reports as follows: an aurora was observed at 7.45 p. m., with dark segment resting upon the northern horizon, above which was an arc of yellowish color. The display extended over about 50° of the northern sky and to an altitude of 15° ; at 10.30 p. m. it disappeared. At Pysht, Washington Territory, the aurora was observed from 8 to 11 p. m.

ELECTRICAL PHENOMENA.

Fort Maginnis, Montana.—The telegraph lines were affected by atmospheric electricity on the afternoon of the 19th.

THUNDER-STORMS.

Thunder storms were reported in the various districts on the following dates:

New England.—11th, 14th, 16th, 17th, 20th, 23d.

Middle Atlantic states.—7th, 13th to 16th, 18th, 19th, 20th, 22d, 23d, 28th.

South Atlantic states.—1st, 2d, 12th, 13th, 14th, 16th to 20th, 22d, 23d, 25th, 27th.

Florida peninsula.—12th to 17th, 19th, 22d, 25th.

Eastern Gulf states.—1st, 12th, 13th, 16th, 17th, 19th, 22d.

Western Gulf states.—4th, 5th, 7th, 8th, 11th, 12th, 13th, 17th, 18th, 19th, 22d, 26th, 27th.

Rio Grande valley.—Rio Grande City, 11th.

Tennessee.—1st, 4th, 5th, 12th, 13th, 19th, 22d, 27th.

Ohio valley.—4th, 5th, 6th, 12th, 17th, 18th, 19th.

Lower lake region.—4th, 5th, 19th.

Upper lake region.—12th, 19th.

Upper Mississippi valley.—4th to 7th, 12th, 17th, 19th.